

## Potential Threats to the Humpback Chub

### 1 – Non-native fish competition and predation

- GCMRC and the Science Advisors have identified this threat as the most urgent to address (GCMRC 2002)
- Bright Angel weir testing has been completed this winter, and the NPS will commence NEPA compliance/public involvement on a long-term project for non-native removal in Bright Angel Creek and, perhaps, other tributaries.
- The TWG recommended to AMWG that there should be control efforts directed at non-native fish in other Grand Canyon tributaries.
- AGFD tested catfish and carp removal techniques in the LCR during Summer 2002, but reported limited success.
- Mainstream salmonid removal efforts are ongoing by GCMRC as part of the experimental flow effort to benefit the HBC and sediment conservation. Approximately 3,600 trout were removed during the first 2-week electrofishing effort in January 2003.
- Current Glen Canyon Dam operations agreed to in the 1996 ROD are being modified in an experiment of winter fluctuating flows as a means of suppressing trout reproduction and recruitment

### 2 – Cold Mainstream Temperatures

- Mainstream temperatures are too cold for HBC egg incubation or larval survival (Hamman 1982, Kaeding and Zimmerman 1983, Marsh 1985, Clarkson and Childs 2000)
- While some mainstream Colorado River recruitment may be occurring, the vast majority of HBC adults in Grand Canyon reside in and near the LCR.
- The SWCA report on establishing a second spawning aggregation of HBC concluded that the mainstream metapopulation alternative was the most likely to succeed, but required warming of dam releases to be successful.
- In response to an AMWG request, the AMP Science Advisors are conducting a risk assessment on the construction and operation of the TCD, expected to be complete by June/July 2003.
- The risk assessment will be included in Reclamation's EA on constructing and using the TCD to warm GCD releases. The EA draft will be complete by September 2003 and will be offered to the AMWG as the basis for a recommendation to the Secretary of the Interior by December 2003. Should the decision be made to proceed, design/construction is expected to last 2 ½ to 3 years.

### 3 – Disease and Parasites

- Asian tapeworm was first discovered in the LCR about 1990 (Clarkson and others 1997). No significant efforts to monitor the tapeworm progress and its effect on HBC, or study methods of eradication have occurred in Grand Canyon.

Laboratory studies, using bonytail as a surrogate species, are ongoing (R. Cole, pers. comm.)

- Monitoring data indicate high infestation of juvenile HBC collected during 2002.
- Rebecca Cole of USGS-BRD will report past research on Asian tapeworm at the next TWG meeting, February 26-27, 2003.

#### 4 – Flow-related Impacts to Habitat

- The 2000 LSSF revealed a doubling of the rate of the main channel warming rate as a result of lower average daily dam release rates. The benefits and risks of such could be similar to that of the TCD.
- It is unclear what habitat impacts (velocity, temperature, turbidity, nutrients) result from either ROD operations or the 2000 LSSF, or what recruitment effects resulted that were attributable to flow/habitat relationships.
- Since it may be a number of years before Lake Powell refills, there is an opportunity of lower than average releases, particularly during the fall period, at which time GCMRC has indicated YOY HBC are typically swept from the LCR by fall monsoon events. This may also augment the findings of Robinson and others (1998) who identified drift of HBC and other native fish from the LCR in the spring.

#### 5 – Turbidity

- A hypothesis has been put forward that increased turbidity, through sediment augmentation or, possibly, flow fluctuations would reduce predation on native fish by sight-feeding predators. Some support for this hypothesis can be found on studies on prairie rivers (Bonner and Wilde 2002).

#### 6 – Potential for Creation of a Refugia, Grow-out, or Hatchery Augmentation Facility

- Valdez and others (2000) cited the need to take HBC from at least the 30-mile aggregation as refugia stock for genetic evaluation and to "...protect unique genetic material if it is found." Studies on the genetics of HBC presently are being conducted by Mike and Marlis Douglas under contract to GCMRC.
- A proposal from FWS was submitted to GCMRC to evaluate the feasibility of developing a program to augment the population of HBC in Grand Canyon. Five specific questions will be addressed by the proposal:
  - o Where could the supplemental fish be grown?
  - o What size fish should be collected, how, from where, and when?
  - o What is the best size fish to grow out captive fish before release?
  - o How many fish will need to be released into the wild in order sufficiently supplement the population of HBC in Grand Canyon?
  - o Where and when will fish be released back into the wild?
- The concept of creating refugia within Grand Canyon will be tested in conjunction with the ongoing experimental flows and mechanical removal by placing young HBC above Atomizer Falls in the LCR. Opportunities may exist to

take the same actions in other tributaries, particularly if non-native control actions are taken in those tributaries.

## 7 – Establishment of a Second Spawning Aggregation

- The SWCA report on establishing a second spawning aggregation of HBC (Valdez and others 2000) concluded that the mainstream metapopulation alternative was the most likely to succeed, but required warming of dam releases to be successful.

## Literature Cited

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